CODE	COURSE TITLE
18MSUC101/ 18MCUC101	CLASSICAL ALGEBRA

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	56	4	-	4

Preamble

- To acquire complete knowledge of summation and approximation through Binomial, Exponential and Logarithmic series
- To understand concepts and improve problem solving skills on theory of equations
- To gain knowledge in theory of numbers

Prerequisite

- Knowledge in basic concepts of series, equations and types of equations

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	find the sum of finite and infinite Binomial, Exponential and Logarithmic series	K1
CO2.	solve equations using various techniques	K2
CO3.	find the approximate roots of an equation by Newton's method and Horner's method	K3
CO4.	gain knowledge in number theory	K2
CO5.	study the concept of congruences and its properties	K2

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1.	M	S	L	M	M
CO2.	M	S	M	S	S
CO3.	S	S	M	S	S
CO4.	M	S	M	M	S
CO5.	S	S	L	M	S

Mapping with Programme Outcomes

S- Strong; M-Medium; L-Low

SEMESTER – I

Core – I: CLASSICAL ALGEBRA

Syllabus

UNIT I **(12 hrs.)**

Binomial, Exponential and Logarithmic Series: Theorems – Statements without proofs – Emphasize on their Immediate Application to Summation and *Approximation*.

UNIT II **(12 hrs.)**

Theory of Equations: Roots of an Equation – Relations Connecting the Roots and Coefficients - Symmetric Function of Roots – Transformations of Equations – *Reciprocal Equations* – Character and Position of Roots – Descarte's Rule of Signs.

UNIT III **(12 hrs.)**

Theory of Equations: Rolle's Theorem – Multiple Roots – Newton's Method of Approximation for Finding Positive Roots upto Two Decimal Places – *Horner's Method upto Two Decimal Places.*

UNIT IV **(12 hrs.)**

Theory of Numbers: Prime and Composite Numbers – the Sieve of Eratosthenes – *Divisors of a Given Number N* – Euler's Function $\phi(N)$ - Integral Part of a Real Number – the Highest Power of a Prime *p* Contained in $n!$ - the Product of *r* Consecutive Integers is Divisible by $r!$ – Congruences.

UNIT V **(12hrs.)**

Theory of Numbers: Properties of Congruences – *Numbers in Arithmetical Progression* – Theorem – Fermat's Theorem – Generalization of Fermat's Theorem – Wilson's Theorem – Lagrange's Theorem.

Note: *Italics* denotes Self Study Topics

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	T. Natarajan, T.K. Manicavachagom Pillay & K.S.Ganapathy	Algebra –Vol. I (Units I, II & III) and Vol. II (Units IV & V)	S.Viswanathan Printers and Publishers Pvt., Ltd.,	Vol. I , 2014-2015 Vol. II, 2012-2013

Unit	Chapter	Sections
I	3	5 – 10, 14
	4	1 – 3, 5 – 9.1, 11(without limit)
II	6	1 – 12, 14 – 19, 21, 24
III	6	25, 26, 30
IV	5	1 - 12
V	5	13 - 18

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	R.M. Khan	Algebra - Classical, Modern, Linear & Boolean	New central Book Agency(P) Ltd.,	Reprint 2016
2	H.S. Hall & S.R.Knight	Higher Algebra	AITBS Publishers, India	Reprint 2014
3	Erwin Kreyszig	Advanced Engineering Mathematics	Wiley & Sons	2012, 9th Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar, Subject Viva

- Question paper setters are asked to confine to the above **text books** only.

CODE	COURSE TITLE
18MSUC102/ 18MCUC102	CALCULUS

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	70	5	--	4

Preamble

- To focus on conceptual understanding
- To explore fundamental concepts of differential and integral calculus
- To explore the solutions of problems from a mathematical perspective, and
- To prepare students to succeed in upper level math, science, engineering and other courses which require calculus

Prerequisites

- Students must know the different types of functions and deriving new functions from given functions
- Students must know the integration of all basic types of functions

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	understand the meaning of differentiation using limits	K1, K2
CO2.	construct n^{th} derivatives of different functions	K3
CO3.	compute radius and centre of curvature	K2
CO4.	evaluate integration of trigonometric functions	K2
CO5.	apply calculus concepts to solve real-world problems such as finding areas and volumes	K3

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1.	M	S	M	M	M
CO2.	M	M	S	S	S
CO3.	S	M	M	M	S
CO4.	M	S	M	S	S
CO5.	S	S	M	S	S

S- Strong; M-Medium; L-Low

SEMESTER – I

Core – II : CALCULUS

Syllabus

UNIT I **(15 hrs.)**

Differentiation – Definition – Standard Forms – Logarithmic Differentiation – Differentiation of Implicit Functions – *Differentiation of one Function with respect to Another* – Successive Differentiation – Leibnitz Formula for n^{th} Derivative of a Product (Statements and Problems only)

UNIT II **(15 hrs.)**

Envelopes – Radius of Curvature in Cartesian and *Polar Forms* – Centre of Curvature – Evolutes and Involutes – Pedal Equations

UNIT III **(15 hrs.)**

Integration of the types $dx/(ax^2+bx+c)$, $lx+m/(ax^2+bx+c)$, $1/\sqrt{ax^2+bx+c}$, $(px+q)/\sqrt{ax^2+bx+c}$, $\frac{1}{a\cos x+b}$, $\frac{1}{a\sin x+b}$ and $\frac{1}{\left(a^2\cos^2 x+b^2\sin^2 x\right)}$ – Integration by parts – Reduction formulae – Problems – *Bernoulli's formula* – Problems

UNIT IV **(15 hrs.)**

Multiple Integrals : Evaluation of Double and Triple Integrals Problems only – Applications to Calculation of Areas and *Volumes* – Jacobians – Change of Variables in Double and Triple Integrals

UNIT V **(15 hrs.)**

Improper Integrals: Infinite Integrals – Simple Problems – Beta and Gamma Integrals – Their Properties – Relation between them – *Evaluation of Multiple Integrals using Beta and Gamma Functions*

Note: *Italics* denote Self Study Topics

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	S. Narayanan and T.K.Manicavachagom Pillay	Calculus, Vol. I (Units I, II)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	2015
2.	S. Narayanan and T.K.Manicavachagom Pillay	Calculus, Vol. II (Units III, IV, V)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	2015

UNIT I	Chapter II & Chapter III	
UNIT II	Chapter X	
UNIT III	Chapter I	Sec 7.3 Rule (b) Type (i) & (ii)
		Sec 8 Case (i) & (ii)
		Sections 9, 12, 13, 15
UNIT IV	Chapter 1V	2.2, 4, 5.3, 5.4, 6.3
	Chapter VI	1.1, 1.2, 2.1 – 2.4
UNIT V	Chapter VII	

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Tom M.Apostol	Calculus Vol.1 and Vol.2	John Wiley & Sons	2016, 2nd Edition
2	James Stewart	Calculus: Early Transcendentals	Thomson Brooks/Cole, USA	2008, 6th Edition

Pedagogy

- Lecture, PPT, Subject Viva, Seminar and Videos

- Question paper setters are asked to confine to the above **text books** only.

CODE	COURSE TITLE
18MSUA101	STATISTICS FOR MATHEMATICS – I

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	70	5	-	4

Preamble

To acquire knowledge in the fundamentals of statistics such as random variables, distribution of the discrete and continuous types, bivariate distributions and functions of random variables

Prerequisite

- Must know the concepts in probability theory such as properties of probability, independent events, conditional probability and Baye's theorem

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	learn the concept of random variables	K1
CO2.	exercise the problem solving ability in statistics	K3
CO3.	study the characteristics of discrete and continuous distributions	K2
CO4.	acquire knowledge in of bivariate distributions	K2
CO5.	make use of random variables to find the distributions of functions of random variables	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1.	M	S	M	S	M
CO2.	S	S	M	S	M
CO3.	M	S	M	S	M
CO4.	M	S	S	S	S
CO5.	M	S	M	S	S

S- Strong; M-Medium; L-Low

SEMESTER – I

Allied – I: STATISTICS FOR MATHEMATICS – I

Syllabus

UNIT I **(15 hrs.)**

Discrete Distributions : Random Variables of the Discrete Type – Mathematical Expectation – Special Mathematical Expectation – Binomial Distribution – *Negative Binomial Distribution* - The Poisson Distribution

UNIT II **(15 hrs.)**

Continuous Distributions : Random Variables of Continuous Type – Exponential, *Gamma* and χ^2 Distributions – Normal Distribution

UNIT III **(15 hrs.)**

Bivariate Distributions: Bivariate Distributions of the Discrete type – Correlation Coefficient - Conditional Distributions – Bivariate Distributions of the Continuous Type – *The Bivariate Normal Distributions*

UNIT IV **(15 hrs.)**

Distributions of Functions of Random Variables: Functions of One Random Variable – Transformations of Two Random Variables – *Several Random Variable* – The Moment Generating Function Technique

UNIT V **(15 hrs.)**

Distributions of Functions of Normal Random Variables: Random Functions Associated With Normal Distributions – The Central Limit Theorem – Approximation for Discrete Distributions - Chebyshev's Inequality – C*onvergence in Probability*

Italics **denote self-study topics**

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Robert V. Hogg, Elliot A. Tanis, Dale L.Zimmerman	Probability and Statistical Inference	Pearson Education Inc.	2015, 9th Edition.

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Presanna Sahoo	Probability and Mathematical Statistics	University of Louisville, USA	2013
2	Barbara Illowsky, Susan Dean	Introductory Statistics	Rice University, Texas	2014 , Last Edition
3	Robert V. Hogg, Joseph W. McKean, Allen T. Craig	Introduction to Mathematical Statistics	Pearson	2018, 8th Edition.
4	S.C. Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons	2014

Pedagogy

- Lecture, PPT, Seminar, Subject Viva, Videos

TEXT BOOK

Unit	Chapter	Sections	Page No.
I	2	2.1 to 2.6	41-72, 79-85
II	3	3.1 to 3.3	87-113
III	4	4.1 to 4.5	125-153
IV	5	5.1 to 5.4	163-179, 187-191
V	5	5.5 to 5.8	192-216

- Question Paper setters are asked to confine to the above **text book only**

CODE	COURSE TITLE
18MSUAP01	**MATHEMATICAL SOFTWARE - I**

Category	CIA	ESE	L	T	P	Credit
ALLIED	**-**	**25**	**-**		**30**	**1**

Preamble

To apply the statistical knowledge acquired through the theory course

Prerequisite

To be familiar with the basic statistical concepts of measures of central tendency, measures of dispersion, descriptive statistics, correlation, regression & testing of hypothesis.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	be equipped with the professional competency through learning Free Open Source Software - R	K3
CO2.	create the database, visualizing and analyzing the data using R	K2
CO3.	make inferences through the results obtained	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	M	S	S
CO2.	S	S	M	S	S
CO3.	S	S	M	S	S

List of practicals

1. Use R as a calculator using basic Commands in R
2. Data entry, manipulation and retrieval
3. Creating frequency and relative frequency distribution in R
4. Creating data frame, matrices
5. Descriptive statistics, Graphics - pie diagram, box plot, histogram, bar plot
6. Creating functions
7. To find mean, median, geometric mean, harmonic mean of numerical data and edit the output
8. To determine standard deviation, variance and checking the consistency of the given data and edit the output
9. Bivariate data- scatter plot, correlation co-efficient, fitting linear regression line and interpreting the result
10. Multiple linear regression models
11. Computation of probabilities in various distributions.(Binomial, Poisson, Normal)
12. Drawing the graph of probability mass and density functions
13. One and two sample'*t*' test and paired' test
14. One way and two way Analysis of Variance tests

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	W. John Braun and Duncan J. Murdoch	A First Course in Statistical Programming with R	Cambridge University Press, Newyork	2007
2.	J H Maindonald	Using R for Data Analysis and Graphics: Introduction, Code and Commentary	*https://cran.r-project.org/doc/contrib/usingR.pdf*	2008
3.	Kim Seefeld and Ernst Linder	Statistics Using R with Biological Examples	*https://cran.r-project.org/doc/contrib/Seefeld_StatsRBio.pdf*	online

CODE	COURSE TITLE
18MSUC203/ 18MCUC203	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	56	4	-	4

Preamble

- To promote conceptual knowledge and problem solving skills of ordinary differential equations and partial differential equations
- To understand the evaluation of different functions through Laplace Transformation

Prerequisite

- Must know the basic formulae of differentiation and problem solving techniques

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	solve the first order differential equations through various techniques	K1 & K2
CO2.	learn the methods of solving second order ODE for different functions of x	K2
CO3.	evaluate the partial differential equations of first order using different methods	K2
CO4.	apply Laplace transformation to solve differential equations	K3
CO5.	make use of inverse Laplace transforms to solve the ordinary differential equations and system of differential	K3

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1.	M	M	L	S	S
CO2.	M	S	M	S	S
CO3.	M	S	M	S	S
CO4.	S	M	L	M	S
CO5.	S	M	M	M	S

S- Strong; M-Medium; L-Low

SEMESTER – II

Core – III: DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

Syllabus

UNIT I **(12 hrs.)**

First order ODEs: First Order Higher Degree Equations- Solvable for *x, y, p* - *Clairaut's form* – Simultaneous Differential Equations of the Form (i) $f_1(D)x + f_2(D)y = h_1(t)$, $g_1(D)x + g_2(D)y = h_2(t)$ where f_1, f_2, g_1 and g_2 Are Rational Functions of $D = d/dt$ with Constant Coefficients, h_1 and h_2 are Explicit Functions of t (ii) $dx / P = dy / Q = dz / R$ – Conditions of Integrability

UNIT II **(12 hrs.)**

Second order ODEs: Particular Integral of Equations of Second Order with Constant Co-efficients for xe^{mx} - Higher Order Equations when F(D) is easily Factorizable – Linear equations with Variable Co-efficients (Reducible to Quadratic form)

UNIT III **(12 hrs.)**

Partial Differential Equations: Formation of Equations by Eliminating Arbitrary Constants and Arbitrary Functions – Definition of General, Particular and Complete Solutions – Singular and General Solutions of First Order Equations in the Standard Forms (i) $f(p,q) = 0$, (ii) $f(z,p,q) = 0$, (iii) $f(x,p) = g(y,q)$, (iv) $z = px + qy + f(p,q)$ – Lagrange's Method of Solving Linear Differential Equations $Pp + Qq = R$

UNIT IV **(12 hrs.)**

Laplace transforms: Definition – Laplace Transforms of e^{at} , $cosat$, $sinat$ and t^n where n is an Integer - *First Shifting Theorem* – Laplace Transforms of $e^{at}cosbt$, $e^{at}sinbt$ and $e^{at}t^n$ - Theorems of $L\{f'(t)\}$, $L\{f''(t)\}$, $L\{f^n(t)\}$.

UNIT V **(12 hrs.)**

Inverse Laplace Transforms: Definition – Solution of Differential Equations with Constant Coefficients using Laplace Transformation – Solving System of Linear Differential Equations using Laplace Transformation

Note: *Italics* denote Self Study Topics

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	S. Narayanan & T.K.Manicavachagom Pillay	Calculus Vol. III	S. Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2015

Unit	Chapter	Sections
I	1	5 – 7.3
	3	1 –6
II	2	1 – 4, 8, 9
III	4	1 - 6
IV	5	1 - 5
V	5	6 - 9

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	M.D.Raisinghania	Ordinary and Partial Differential Equations	S.Chand & Sons	2016, 18th Edition
2	Erwin Kreyszig	Advanced Engineering Mathematics	Wiley & Sons	2012, 9th Edition
3	B.S.Grewal	Higher Engineering Mathematics	Khanna Publishers	2014, 43rd Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar, Subject Viva

- Question paper setters are asked to confine to the above **text book** only.

CODE	COURSE TITLE
18MSUC204	TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES

Category	CIA	ESE	L	T	P	Credit
CORE	20	55	42	3	--	3

Preamble

- To focus on conceptual understanding
- To introduce logarithm of a complex quantity
- To prepare students to succeed in upper level math, science, engineering and other courses which require trigonometry and vector calculus
- To impart the application of sine and cosine functions in signals using Fourier series

Prerequisite

- Students must know the basics of trigonometric identities, complex number system and the difference between scalars and vectors

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	expand sines and cosines of multiples of theta and powers of theta	K2
CO2.	find logarithm of a complex number and summation of trigonometric series	K1
CO3.	understand the relation between directional derivative, gradient, divergence and curl	K1
CO4.	make use of theorems to study relation between line, surface and volume integrals	K3
CO5.	evaluate line, surface and volume integrals	K3

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1.	M	S	L	M	S
CO2.	M	M	M	M	S
CO3.	M	M	L	S	S
CO4.	S	S	M	S	S
CO5.	S	S	M	S	S

S- Strong; M-Medium; L-Low

SEMESTER – II

Core – IV: TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES

Syllabus

UNIT I **(9 hrs.)**

Expansions: Expansion of $\cos n\phi$, $\sin n\phi$, $\cos^n \phi$, $\sin^n \phi$ – **Hyperbolic functions** – Separation of real and imaginary parts of $\sin(\alpha + i\beta)$, $\cos(\alpha + i\beta)$, $\tan(\alpha + i\beta)$, $\sinh(\alpha + i\beta)$, $\cosh(\alpha + i\beta)$, $\tanh(\alpha + i\beta)$, $\tan^{-1}(\alpha + i\beta)$

UNIT II **(9 hrs.)**

Logarithm of a Complex Number and Summation of Series: Logarithm of a Complex Number – Summation of Trigonometric Series – Method of Differences – *When Angles are in A.P*.

UNIT III **(9 hrs.)**

Scalar and Vector Point Functions– Directional Derivative, Gradient, *Divergence*, Curl –Summation notation for Divergence and Curl – Laplacian Differential Operator – Problems

UNIT IV **(9 hrs.)**

Integration of Vectors : Line, Surface and Volume Integrals – Theorems of Gauss, Green, *Stokes* (Statements only) – Verification

UNIT V **(9 hrs.)**

Fourier Series : Definition – Finding Fourier Coefficients for a Given Periodic Function with Period 2π – Odd and Even Functions – *Half Range Series*

Note: *Italics* denote Self Study Topics

CODE	COURSE TITLE
18MSUA202	**STATISTICS FOR MATHEMATICS – II**

Category	CIA	ESE	L	T	P	Credit
ALLIED	25	75	98	7	-	5

Preamble

To learn the theory of estimation and testing of statistical hypothesis

Prerequisite

- Must have the basic knowledge about the characteristics of statistical measures

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	learn the theory of estimation	K1
CO2.	acquire knowledge about confidence intervals	K2
CO3.	formulate the statistical hypothesis	K3
CO4.	enhance the statistical knowledge by applying the techniques learned in testing of statistical hypothesis	K2
CO5.	analyze and draw inferences based on the results of the testing of hypothesis	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1.	M	S	M	S	M
CO2.	M	S	M	S	M
CO3.	S	S	S	S	S
CO4.	M	S	M	S	S
CO5.	S	S	M	S	S

S- Strong; M-Medium; L-Low

SEMESTER – II

Allied – I: STATISTICS FOR MATHEMATICS – II

Syllabus

UNIT I **(21 hrs.)**

Point Estimation : Maximum likelihood estimation – A simple regression problem – Sufficient Statistics –*.Descriptive Statistics*

UNIT II **(21 hrs.)**

Interval Estimation : Confidence Intervals for Means – Confidence Intervals for the Difference of Two Means – *Confidence Intervals of Proportions*– Sample Size.

UNIT III **(21 hrs.)**

Test of Statistical Hypothesis : Tests About One Mean – Tests of the Equality of Two Means – *Tests About Proportions* – Power of a Statistical Test – Best Critical Regions.

UNIT IV **(21 hrs.)**

Some more Parametric Tests : Chi-Square Goodness of Fit – Contingency Tables – Tests Concerning Regression – *Correlation*.

UNIT V **(21 hrs.)**

Analysis of Variance : One – Factor Analysis of Variance – Two Way Analysis of Variance.

- ***Italics*** **denotes self-study topics**

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Robert V. Hogg, Elliot A. Tanis, Dale L. Zimmerman	Probability and Statistical Inference	Pearson Education Inc.	2015, 9th Edition.

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Presanna Sahoo	Probability and Mathematical Statistics	University of Louisville, USA	2013
2.	Barbara Illowsky, Susan Dean	Introductory Statistics	Rice University,Texas	2014 , Last Edition
3.	Robert V. Hogg, Joseph W. McKean, Allen T. Crag	Introduction to Mathematical Statistics	Pearson	2018, 8th Edition.
4.	S.C. Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons	2014

Pedagogy

- Lecture, PPT, Seminar, Subject viva, Videos

TEXT BOOK:

Unit	Chapter	Sections	Page No
I	6	6.1, 6.4, 6.5, 6.7	256-266
II	7	7.1 to 7.4	301-315,324-331
III	8	8.1 to 8.3, 8.5, 8.6	355-371, 392-406
IV	9	9.1, 9.2, 9.6	415-435, 462-467
V	9	9.3 to 9.4	435-455

- Question paper setters are asked to confine to the above **text book only.**

CODE	COURSE TITLE
18MSUCP01	MATHEMATICAL SOFTWARE – II

Category	CIA	ESE	L	T	P	Credit
CORE	--	25	--	--	15	1

Preamble

- To give hands-on experience in the Free Open Source Software SageMath which will be highly useful for future teachers and researchers
- To visualize the mathematical concepts for better understanding

Prerequisites

- Students must know the basic concepts of number theory, calculus, theory of equations and differential equations

Course Outcomes

On the successful completion of the course, students will be able to

	CO Statement	Knowledge Level
CO1.	use Geogebra to draw geometrical shapes	K2
CO2.	use SageMath as a calculator	K3
CO3.	solve number theory problems	K3
CO4.	make use of theoretical concepts to solve problems and visualize the output	K3

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	S	S	S
CO2.	S	S	S	S	S
CO3.	S	S	S	S	S
CO4.	S	S	S	S	S

S- Strong; M-Medium; L-Low

SEMESTER – II

Core Practical : MATHEMATICAL SOFTWARE – II

List of Practical – SAGEMATH

1. Use SageMath as a calculator – A Financial Example
2. Use Sage for Trigonometry
3. Use Sage to Graph 2-Dimensionally
4. Superimposing Multiple Graphs in One Plot
5. Solve a Linear System of Equations

   3481x + 59y + z = 0:87
   6241x + 79y + z = 0:61
   9801x + 99y + z = 0:42
6. Making Own Functions and Plotting in Sage
7. Solving Linear and Non-Linear Systems of Equations
8. Use Sage as a Numerical Solver
9. Use Sage to find Derivatives & Plot f(x) and f'(x) Together and find Higher-Order Derivatives
10. Use Sage to Calculate Integrals
11. Labeling the Axes of Graphs
12. Graphing an Integral
13. Parametric 2D Plotting
14. Vector Field Plots, Gradients and Vector Field Plots
15. Working with the Integers and Number Theory
16. Combinations and Permutations

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Gregory V. Bard	Sage for Undergraduates	online version	--

1. p.6
2. p.7 – 8
3. p.8 – 11
4. p.14
5. p.24
6. p.30
7. p.39 – 40
8. p.43
9. p.49 – 50
10. p.51 – 58
11. p.91 – 94
12. p.95 – 97
13. p.112 – 114
14. p.114 – 115
15. p.145 – 147
16. p.153